

**RESPONSE TO MDEQ MARCH 6, 2015 COMMENTS ON THE JANUARY 30, 2015
REVISED DRAFT AREA-WIDE NON-PCB CONSTITUENT SCREENING EVALUATION**

- 1) ES-5, pg. 2-14, pg. 2-17, Appendix F, page 7. Remove the following paragraph in the various locations that it appears in the document. The CDM Smith memo identified some potential dioxin sources to the Kalamazoo River but was merely a summary document. Better sources of information are available that describe potential sources. Although the data clearly show that dioxins (CDDs)/furans (CDFs) were found in Kalamazoo paper residuals and at concentrations higher than CDDs/CDFs found in soils and sediments, the discussion in the text appears to omit these findings: *“A memo provided by MDEQ summarizing dioxin data in the Kalamazoo River noted that ‘Potential anthropogenic sources include: releases from processes such as municipal, medical and hazardous waste incinerators, cement kilns, steel plants, and wood combustion. Other sources include the dispersion of commercial products contaminated by CDDs and CDFs [dioxins/furans] such as certain pesticides and chlorinated solvents such as PCBs. (CDM 2001). This region has contained a number of potential sources as listed above.’”*

Response: Text was added on ES-5, pg 2-14, and F-7 as follows: *“Dioxins are formed as the result of combustion processes such as the burning of wood, coal, and oil (FDA 2008). Additional sources include air emissions from commercial and municipal waste combustion, hazardous waste incineration, chemical production, and cement kilns and also include wastewater releases from chlorine-bleached pulp and paper mills (Hutzinger et al. 1985, Ballschmiter et al. 1986, USEPA 2006a). Paper recycling and secondary fiber mills are also reportedly sources of dioxins/furans (Rappe et al. 1990). However, several studies indicate that dioxins/furans concentrations in effluent from the paper recycling industry and secondary fiber mills (not using bleaching processes) contain lower concentrations of dioxins/furans than that found in paper mill wastes that use bleaching processes (Rappe et al. 1990, USEPA 1993, USEPA 2006a). This region has contained a number of potential sources as listed above.” A modified version of this text was added to F-7.*

- 2) Replace the above paragraph in ES-5 and pg. 2-17 with the following example language or similar language that meets the intent, including citations: *“Sources of dioxins (CDDs) and furans (CDFs) include waste incinerators, cement kilns, steel plants, wood combustion, certain pesticides, chlorinated solvents, and bleach kraft paper mills (EPA, 1990; EPA, 2006; EPA,2007). Paper recycling and secondary fiber mills (not using bleaching processes) are also documented sources of CDDs and CDFs Rappe et al., 1990; Berry et al., 1993, EPA, 1993).”*

Response: See response to comment 1 above.

- 3) Pg. 3-11. Remove the following statement beginning with “Anthropogenic sources of TCDD TEQ likely also contribute to soil...this region includes industrial areas that contained several of the sources listed above.” As an example, replace with: *“Sources of dioxins (CDDs) and furans (CDFs) include waste incinerators, cement kilns, steel*

plants, wood combustion, certain pesticides, chlorinated solvents, and bleach kraft paper mills (EPA, 1990; EPA, 2006; EPA,2007). Paper recycling and secondary fiber mills (not using bleaching processes) are also documented sources of CDDs and CDFs Rappe et al., 1990; Berry et al., 1993, EPA, 1993). Dioxin TCDD TEQ averaged 161 parts per trillion (ppt) in Kalamazoo River floodplain soils, well above the expected dioxin soil background level. For example, average concentrations of 3.1 ppt were identified in Jackson and Calhoun Counties (UMDES, 2008). Therefore, background dioxin levels are much lower than those found in Kalamazoo River floodplain soils."

Response: *The text was removed and a reference to Appendix F was included. The information discussed on page 3-11 pertains to sediment so that direct comparisons of soil concentration to sediment is not appropriate here.*

- 4) Use UMDES dioxin data to represent background soil data in all analytical and statistical comparisons provided in the document. The University of Michigan study, which analyzed soils in urban areas in Jackson and Calhoun Counties, represents the best estimate of dioxin background for the Kalamazoo site at this time.

Response: *Dioxins/furans are retained as constituents of interest and are not screened out because of background values. The UMDES data are included in the main body of the report and in Appendix F as a compilation of background concentrations. The data from the UMDES study are from urban areas which include soil samples collected from the perimeter of houses. No one study is fully representative of the floodplain soils collected along the banks of the Kalamazoo River. Therefore, a number of studies were cited and collectively provide an appropriate range of dioxins/furans concentrations that may be compared to the concentrations detected in Areas 1, 2, and 3. Using a collection of studies only serves to strengthen the conclusion that dioxins/furans are appropriately identified as constituents of interest.*

It is appropriate to compare concentrations detected in Areas 1, 2, and 3 to a range or an upper confidence limit, rather than an average. This type of comparison provides an understanding of the values in the context of the distribution and variance of the background data set. For example, the mean of 3.1 ppt does not match the median (suggestive of a skewed or asymmetrical distribution), indicating that the mean may not be the best representation of the data. The 95th percentile value of 9.4 ppt and the range were included in the text. Additional information from the UMDES study was added to Appendix F (page F-8 to F-9) as listed below.

- *Sampling of house perimeter soils (0-1 inches) in this study indicated 95th percentile concentrations of 12.2 ng/kg (median: 2.9 ng/kg, mean: 4.8 ng/kg, range: 0.3 to 64.1 ng/kg, N = 194 soil samples, for 17 dioxin congeners excluding PCBs) in Jackson and Calhoun counties in Michigan (University of Michigan 2008). Sampling of house perimeter soils (1-6 inches) in this study indicated 95th percentile concentrations of 22.2 ng/kg (median: 6.8 ng/kg, mean: 8.1 ng/kg, range: 0.7 to 31.9 ng/kg, N = 53 soil samples, for 17 dioxin congeners excluding PCBs) in Jackson and Calhoun counties in Michigan.*

A second study in Michigan where samples were collected and analyzed for dioxins/furans was added to the document and is also included in Appendix F as follows:

- An MDEQ study of statewide background dioxin concentrations in soil including sampled locations in Jackson, Calhoun, and Kalamazoo counties (MDEQ 1999b) reported the following dioxin TEQs calculated using 1998 TEFs: 6.5 ng/kg (Loomis Park – Jackson in Jackson County), 3.6 ng/kg (Portage in Kalamazoo County), 14.9 ng/kg (Vicksburg in Kalamazoo County), and 34.7 ng/kg (Battle Creek in Calhoun County). It is uncertain if the values reported in the study are means or some other value.*

The range of concentrations provided in the document include the data from the University of Michigan study and MDEQ study and appropriately distinguishes between the higher dioxins/furans concentrations that are located within the remedial footprints and those that are outside of that footprint.

- 5) Appendix F, pg. 7. Remove the entire first paragraph beginning with: *“While dioxin/furan compounds found within the Kalamazoo are potentially associated with paper residuals, dioxins and furans can arise from numerous anthropogenic sources...”* Replace with the following example language or similar language that meets the intent: *“Major sources of dioxins/furans are fuel burning, metal refining, chlorine bleaching, municipal waste incineration, and chemical production (Hutzinger et al. 1985; Ballschmiter et al. 1986; EPA, 2006). The manufacture of paper using chlorine, sulfites and other oxidative processes are also known to produce dioxins/furans as have paper recycling and secondary fiber production not using bleaching (EPA, 1990; Rappe et al., 1990; EPA, 1993; Berry et al., 1993; EPA, 2006; EPA, 2007). In the past, the production of chlorophenols and phenoxy herbicides was attributed to some localized high concentrations of dioxins on U.S. waterways.”*

Response: *The text “While dioxin/furan compounds found within the Kalamazoo are potentially associated with paper residuals, dioxins and furans can arise from numerous anthropogenic sources” is accurate. The statement as written acknowledges that dioxins/furans are detected in the paper residuals. The source statement was revised as follows: “Dioxins are formed as the result of combustion processes such as the burning of wood, coal, and oil (FDA 2008). The most significant airborne sources include waste incinerators, chemical tar burners, forest fires, wood-burning stoves, petroleum power plants, and diesel-burning vehicles (Fiedler 1996; Thomas and Spiro 1995; USEPA 2006). Additional sources include air emissions from cement kilns and wastewater releases from chlorine-bleached pulp and paper mills (Hutzinger et al. 1985; Ballschmiter et al. 1986; USEPA 2006). Paper recycling and secondary fiber mills are also reportedly sources of dioxins/furans (Rappe et al. 1990). However, several studies indicate that dioxins/furans concentrations in effluent from the paper recycling industry and secondary fiber mills (not using bleaching processes) contain lower concentrations of dioxins/furans than that found in paper mill wastes that use bleaching processes (Rappe et al. 1990, USEPA 1993, USEPA 2006).”*

- 6) There is excessive discussion suggesting that combustion sources (e.g., forest fires) are major contributors to background levels of dioxins, where evidence shows that this is not the case. Place the following example language or similar language that captures the intent, at the end of the dioxin/furan source discussion on pg. F-8 and prior to bullet summary of dioxin background levels: *“While there may be combustion sources of CDDs/CDFs in the Kalamazoo area, they appear to be very minor contributors to CDDs/CDFs found in Kalamazoo River site soils. Background dioxin soil data, excluding PCB congeners, for in Jackson and Calhoun Counties (UMDES, 2008) averaged 3.1 ppt (9.4 ppt upper 95th percentile) TCDD TEQ, about 2% of average TCDD TEQ levels of 161 ppt found in Kalamazoo floodplain soils. Dioxins and furans were found in Kalamazoo paper residuals at several locations and co-located with PCBs (CDM, 2001). Paper residuals have 2,3,7,8-TCDD, 2,3,7,8-TCDF, HxCDD, HpCDD and Octa-CDD in similar ratios and in percentage contributions to total dioxin 2,3,7,8-TCDD (dioxin) TEQs as those found in soil samples.”*

Response: According to USEPA (2006) combustion is a major source of dioxin/furan emissions so this discussion is important and relevant in this industrialized region. Additional text concerning sources related to the paper making process has been added. Please see response to comment 4 above on the background studies. There are multiple sources that may have similar ratios of the individual dioxin/furan components according to USEPA studies (USEPA 2006) so that this characteristic is not unique to paper residuals.

- 7) Appendix F, pg. 8. Modify to read as follows to include the mean dioxin level and the fact that this comprehensive study was conducted in urban areas: *“A University of Michigan (2005, 2008) dioxin study reported a mean TCDD TEQ of 3.1 ppt (95th percentile of 9.4 ng/kg) for 17 dioxin congeners, excluding PCBs, in Jackson and Calhoun counties in Michigan in soils from 0-6 inches in depth. This data set is based on 124 soil samples collected from urban areas. Including PCBs, house perimeter soils had average total TCDD TEQs of 11.2 ppt (1-6” depth, 53 samples) and 6.9 ppt (0-1” depth, 194 samples)”. Copies of the referenced U of M studies can be supplied if necessary.*

Response: The additional house perimeter soils were added (pg. F-8). See response to comment 4 above.

- 8) Appendix F, pg. 8. The use of out of state studies, such as the Seattle dioxin study, should be qualified as it is not area specific to the Kalamazoo site and the text places inappropriate emphasis on high-end dioxin values rather than average levels. The University of Michigan study, which analyzed soils in urban areas in Jackson and Calhoun Counties is the most comprehensive background dioxin study conducted in Michigan and, represents appropriate dioxin background for the Kalamazoo site.

Response: The UMDES data are included in Appendix F as a compilation of background concentrations. Additional information from the UMDES study was added to Appendix F (page F-8). The data from the UMDES study are from urban areas and houses which may not be appropriately representative of floodplain soils. A number of

studies are presented to provide a range of background concentrations that may be similar to background for the Kalamazoo River.

The range of concentrations provided in the document include the data from the University of Michigan study as well as others and appropriately distinguishes higher dioxins/furans concentrations that are located within the remedial footprints from those that are outside of that footprint. Therefore, the intent of using a background range as a comparison meets the intent of identifying data as within or outside of a remedial footprint.

- 9) Where data is available, add to figures total dioxins that represent the sum CDDs, CDFs, and co-planer PCB DLCs. MDEQ's residential dioxin criteria for dioxin of 90 ppt and the 250 ppt site specific value for Midland Michigan are based on total CDDs, CDFs, and PCB DLCs (MDEQ, 2012). At a minimum, the report should acknowledge the data, its importance in understanding total TEQ, and identify where the data are available for review.

Response: *A separate memorandum will be submitted to USEPA and MDEQ following the submittal of the Area-Wide Non-PCB Constituent Screening Evaluation on April 3, 2015; this document addresses the dioxin-like PCB congeners and shows that risk management and remedial decisions based on total PCBs will also address the dioxin-like PCBs and dioxins/furans. Dioxin-like PCBs were not addressed in the non-PCB screening document to focus the reader on non-PCB constituents. In this memorandum, TEQs for dioxins/furans and TEQs for dioxin-like PCBs were not added together because no samples were analyzed for both. Samples were either analyzed for one or the other.*

References for the above comments

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- Thomas, V.M.E., and T.G. Spiro, 1995. An Estimation of Dioxin Emissions in the United States. *Toxicol. Environ. Chem.* 50:1-37.
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- USEPA, 1993. Development document for proposed effluent limitations guidelines and standards for the pulp, paper and paperboard point source category. Washington, DC: Office of Water. EPA-821-R-93-019.
- USEPA, 2006. An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States for the Years 1987, 1995, and 2000. National Center for Environmental Assessment, Washington, DC; EPA/600/P-03/002F.